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FITZPATRICK CELLA HARPER & SCINTO 30 ROCKEFELLER PLAZA NEW YORK, NY 10112			THOMPSON, JAMES A	
			ART UNIT	PAPER NUMBER
			2624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/586,884

Applicant(s)

KONNO ET AL.

Examiner

James A. Thompson

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 October 2005 and 29 August 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1, 17, 34-47, 78-84 and 90-92 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 48-52, 56, 60, 64 and 68 is/are allowed.
- 6) ☒ Claim(s) 1, 17, 34-47, 78-84 and 90-92 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 June 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments filed 29 August 2005 have been fully considered but they are not persuasive. The arguments with regard to the prior rejections in the previous office action, dated 10 March 2005 and mailed 28 March 2005, are given in substantive form in Applicant's arguments filed 29 August 2005. Said arguments are referred to in Applicant's arguments filed 11 October 2005. Applicant's arguments filed 11 October 2005 are for the purpose of explaining the amendment to the claims that overcomes the Notice of Non-Compliant Amendment mailed 19 September 2005 and reiterating Applicant's desire for an allowance based on the claim amendments and the arguments presented in Applicant's arguments filed 29 August 2005.

Applicant's primary argument alleges that Curry (US Patent 5,696,604), which is used to reject claims 1, 17, 34-37, 39-42, 48-52, 56, 60, 64, 68, and 90-92 under 35 USC §102(b), does not teach the recited limitations "a dot-pattern table having a plurality of different dot patterns associated with gradation value and pixel position" and "wherein the dot pattern table has a plurality of different dot patterns, each having the same dot number and a different dot arrangement, corresponding to the same gradation value", as recited in claim 1, with specific emphasis on the allegation that Curry does not teach that there are a plurality of different dot patterns for each gradation value. There is identical or similar language present in the other independent claims. Upon further examination of the cited reference and in light of Applicant's present arguments, Examiner agrees with Applicant that Curry does not teach the

disputed limitations of the independent claims. Thus, the prior art rejections given in said previous office action are withdrawn.

However, additional art, specifically Lin (US Patent 6,633,412 B1) and Hirahara (US Patent 5,099,259), have been discovered which anticipates some of the presently amended claims and renders some of the presently amended claims obvious to one of ordinary skill in the art at the time of the invention. Some claims have also been deemed allowable over the prior art. The present rejections and allowances are discussed in detail below.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 17, 34-42 and 90-92 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin (US Patent 6,633,412 B1) in view of Hirahara (US Patent 5,099,259).

**Regarding claims 1, 17, 34 and 35:** Lin discloses an image recording apparatus (figure 11 and column 7, lines 23-27 of Lin) comprising a dot-pattern-generation unit for generating a plurality of different dot patterns associated with gradation value and pixel position (column 6, lines 60-63 of Lin); selection means for selecting one dot-pattern from said plurality of

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different dot patterns (column 7, lines 5-10 of Lin), based on gradation-value information of the pixel of the image data and position information of the pixel (column 6, line 64 to column 7, line 5 of Lin); and recording control means for controlling a recording head so as to record an ink dot based on the dot pattern selected by said selection means of a recording medium (column 4, lines 58-64 of Lin), wherein said plurality of different dot patterns each have the same dot number and a different dot arrangement, corresponding to the same gradation value (column 7, lines 2-5 of Lin), and wherein the plurality of different dot patterns corresponding to the same gradation value are associated with a plurality of pixel positions corresponding to a plurality of pixels arranged in a first direction substantially corresponding to a direction of arrangement of nozzles of the recording head (figure 10 (vertical direction of halftone cells) and column 7, lines 9-13 of Lin). Said plurality of pixels are arranged in both the vertical direction and the horizontal direction, which provides the tiling of the halftone cells (figure 8; figure 10; and column 7, lines 9-13 of Lin). A first direction substantially corresponding to a direction of arrangement of nozzles of the recording head is the vertical direction.

Lin does not disclose expressly a dot-pattern-table storage unit for storing a dot-pattern table having said plurality of said different dot patterns associated with gradation value and pixel position; and that said selection means selects said one dot pattern from said dot-pattern storage unit, wherein the dot pattern table has a plurality of different dot patterns, each having the same dot number and a different dot arrangement, corresponding to the same gradation value.

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Hirahara discloses a dot-pattern-table storage unit (figure 46(3) of Hirahara) for storing a dot-pattern table (figure 44 of Hirahara) having a plurality of different dot patterns (column 15, lines 48-53 of Hirahara).

Lin is analogous art since Lin is from the same field of endeavor as the present application, namely controlling dot patterns based on position and grayscale value in a halftone image data processing system. Lin and Hirahara are combinable because they are from the same field of endeavor, namely controlling dot patterns in a halftone image data processing system. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to store the plurality of patterns taught by Lin in the dot-pattern-table storage unit taught by Hirahara. Thus, said selection means taught by Lin selects said one dot pattern from the dot-pattern storage unit taught by Hirahara, wherein the dot pattern table taught by Hirahara has a plurality of different dot patterns, each having the same dot number and a different dot arrangement, corresponding to the same gradation value, as taught by Lin. The motivation for doing so would have been to speed up the data processing by having the dot patterns generated by the system of Lin stored, and thus readily accessible. Therefore, it would have been obvious to combine Hirahara with Lin to obtain the invention as specified in claims 1, 17, 34 and 35.

Further regarding claim 1: The apparatus of claim 17 performs the method of claim 1.

Further regarding claim 34: The apparatus of claim 17 embodies the code and code steps stored in the storage medium of claim 34 (column 7, lines 44-49 of Lin).

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Further regarding claim 35: Lin discloses that the plurality of different dot patterns are assigned to a plurality of pixels arranged in a second direction orthogonal to the first direction (figure 10(horizontal direction of halftone cells) and column 7, lines 9-13 of Lin). Said plurality of pixels are arranged in both the vertical direction and the horizontal direction, which provides the tiling of the halftone cells (figure 8; figure 10; and column 7, lines 9-13 of Lin). A second direction orthogonal to the first direction is the horizontal direction.

Further regarding claims 34 and 35: Recording an ink dot based on the dot pattern selected in said selection means is also considered an output step for outputting said dot pattern.

**Regarding claim 36:** Lin discloses that the dot pattern table is a two-dimensional table (figure 10(bottom figure) and column 7, lines 2-5 of Lin) expanding in a first direction substantially corresponding to a direction of arrangement of nozzles of the recording head (figure 10(vertical direction of halftone cells) and column 7, lines 9-13 of Lin) and in a second direction substantially corresponding to a moving direction of the recording head (figure 10(horizontal direction of halftone cells) and column 7, lines 9-13 of Lin), and wherein the dot pattern is a two-dimensional pattern expanding in the first direction and in the second direction (figure 10 and column 7, lines 9-13 of Lin). Said plurality of pixels are arranged in both the vertical direction and the horizontal direction, which provides the tiling of the halftone cells (figure 8; figure 10; and column 7, lines 9-13 of Lin). A first direction substantially corresponding to a direction of arrangement of nozzles of the recording head is the vertical direction. A

second direction orthogonal to the first direction is the horizontal direction, which is the direction in which the recording head moves.

**Regarding claim 37:** Lin discloses that, when sized of the dot pattern table in the first direction and the second direction are represented by  $L$  and  $K$ , and sizes of the dot pattern table in the first direction and the second direction are represented by  $l$  and  $k$ , respectively, the size of the dot pattern table and the size of the dot pattern have relationships of  $L=\alpha \times l$  ( $\alpha$  is a natural number), and  $K=\beta \times k$  ( $\beta$  is a natural number), and wherein  $\alpha$  dot patterns and  $\beta$  dot patterns having the same gradation value are stored in the first direction and the second direction, respectively, in the dot pattern table (figure 10 and column 7, lines 2-5 of Lin). Since  $\alpha$  and  $\beta$  are both natural numbers and the dot pattern is tiled over the image space (figure 10 and column 7, lines 2-5 of Lin), then  $L=\alpha \times l$  and  $K=\beta \times k$  are natural relationships between the size of the dot pattern table and the size of the dot pattern in each respective direction.

**Regarding claim 38:** Lin discloses that the dot pattern table is repeatedly used at every  $L$  pixels in the first direction and at every  $K$  pixels in the second direction (figure 10 and column 7, lines 2-5 of Lin).

**Regarding claim 39:** Since there is inherently an integer number of cells ( $L$ ) and an integer number of nozzles of the recording head ( $A$ ) and  $\alpha$  is a natural number, then it is inherent that a number of cells  $L$  of the dot pattern table in the first direction and a number of nozzles  $A$  of the recording head have a relationship  $L=\alpha \times A$  ( $\alpha$  is a natural number).



**Regarding claim 40:** Lin discloses that, when the position information of the pixel is represented by two-dimensional coordinates  $(x,y)$ , and the x-coordinate and the y-coordinate correspond to the second direction and the first direction, respectively, the dot pattern selected in said second selection step is a dot pattern at a position specified based on the x-coordinate value, the y-coordinate value, the value  $\alpha$ , and the value  $\beta$  within the dot pattern table (column 6, lines 60-63 and column 7, lines 2-5 of Lin). The dot pattern is based on both the position in the x and y directions (column 6, lines 60-63 of Lin) and the specific tile within the image data, thus corresponding to the value  $\alpha$ , and the value  $\beta$  within the dot pattern table (column 7, lines 2-5 of Lin).

**Regarding claim 41:** Lin discloses that the dot pattern table is determined in consideration of characteristics of each of a plurality of nozzles of the recording head (column 8, lines 51-59 of Lin).

**Regarding claim 42:** Lin discloses that a number of dot pattern tables determined in consideration of the characteristics of each of the nozzles, from among N dot-pattern tables provided for corresponding ones of N gradation values, is H ( $N>H$ , H is a natural number) (column 7, lines 2-5 and column 8, lines 51-59 of Lin). The dot patterns are tiled over the whole image, with a different dot pattern produced for each tile (column 7, lines 2-5 of Lin). Thus, depending on the size of the image and the size of the tile, so long as the number of tiles (H) is less than the number of gradation values (N), then  $N>H$ , H is a natural number.

**Regarding claims 90-92:** Lin discloses a selection step for selecting one dot pattern based on gradation-value information

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of the pixel of the image data and position information of the pixel (column 6, line 64 to column 7, line 5 of Lin), from a plurality of different dot patterns associated with gradation value and pixel position (column 7, lines 5-10 of Lin); and a recording step for recording an ink dot based on the dot pattern selected by said selection step on a recording medium using a recording head (column 4, lines 58-64 of Lin), wherein said plurality of different dot patterns each have the same dot number and a different dot arrangement, corresponding to the same gradation value (column 7, lines 2-5 of Lin), and wherein the dot pattern table is repeatedly used at each of a plurality of pixels (figure 10(bottom figure) and column 7, lines 2-5 of Lin) in a first direction substantially corresponding to a direction of arrangement of nozzles of the recording head (figure 10(vertical direction of halftone cells) and column 7, lines 9-13 of Lin) and is repeatedly used at each of a plurality of pixels (column 7, lines 2-5 of Lin) in a second direction orthogonal to the first direction (figure 10(horizontal direction of halftone cells) and column 7, lines 9-13 of Lin). Said plurality of pixels are arranged in both the vertical direction and the horizontal direction, which provides the tiling of the halftone cells (figure 8; figure 10; and column 7, lines 9-13 of Lin). A first direction substantially corresponding to a direction of arrangement of nozzles of the recording head is the vertical direction. A second direction orthogonal to the first direction is the horizontal direction.

Lin does not disclose expressly a dot pattern table having said plurality of said different dot patterns associated with gradation value and pixel position; and that one dot pattern is selected from said dot pattern table in said selection step.

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Hirahara discloses a dot-pattern table (figure 44 of Hirahara) having a plurality of different dot patterns (column 15, lines 48-53 of Hirahara).

Lin is analogous art since Lin is from the same field of endeavor as the present application, namely controlling dot patterns based on position and grayscale value in a halftone image data processing system. Lin and Hirahara are combinable because they are from the same field of endeavor, namely controlling dot patterns in a halftone image data processing system. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to store the plurality of patterns taught by Lin in a dot pattern table, as taught by Hirahara. Thus, in said selection step taught by Lin, one dot pattern is selected from the dot pattern table taught by Hirahara, wherein the dot pattern table taught by Hirahara has a plurality of different dot patterns, each having the same dot number and a different dot arrangement, corresponding to the same gradation value, as taught by Lin. The motivation for doing so would have been to speed up the data processing by having the dot patterns generated by the system of Lin stored, and thus readily accessible. Therefore, it would have been obvious to combine Hirahara with Lin to obtain the invention as specified in claims 90-92.

Further regarding claim 90: The method of claim 90 is fully embodied within the method of claim 92.

Further regarding claim 91: The method of claim 91 is fully embodied within the method of claim 92.

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4. Claim 43 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin (US Patent 6,633,412 B1) in view of Hirahara (US Patent 5,099,259) and Hayashi (US Patent 5,801,845).

**Regarding claim 43:** Lin discloses that the dot pattern tables are customized to the attributes of individual printers (column 8, lines 51-59 of Lin).

Lin in view of Hirahara does not disclose expressly that said dot pattern table corresponds to a gradation value such that a ratio of dots  $D$  (%) provided within a pixel is within a range of  $25 \leq D \leq 50$ .

Hayashi discloses printing for gradation values that are between a lower bound and an upper bound (figure 4a and column 8, lines 20-37 of Hayashi). Said lower bound is set based on the ability of the ink to adhere to the paper (column 8, lines 38-46 of Hayashi). Said upper bound is set based on the ability of the ink to not saturate in printing on the paper (column 8, lines 47-55 of Hayashi).

Lin in view of Hirahara is combinable with Hayashi because they are from the same field of endeavor, namely halftone image data processing and printing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to set the overall gradation value for the dot pattern table such that a ratio of dots provided within a pixel is within a range that allows for the proper and smooth operation of the nozzles. Setting said range to between and including 25% to 50% would have been a reasonable and obvious choice for processing a set of gradation levels. The motivation for doing so would have been so that printing is only performed when the ink can properly adhere to the paper (column 8, lines 38-46 of Hayashi)

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and not performed in such a way as to attempt to add ink when the paper is already saturated (column 8, lines 47-55 of Hayashi). Therefore, it would have been obvious to combine Hayashi with Lin in view of Hirahara to obtain the invention as specified in claim 43.

5. Claims 44-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin (US Patent 6,633,412 B1) in view of Hirahara (US Patent 5,099,259) and Kelly (US Patent 5,528,387).

**Regarding claim 44:** Lin in view of Hirahara does not disclose expressly that cells in the second direction (moving direction of the recording head) from among cells positioned at end portions of the dot pattern table do not include dot information.

Kelly discloses that edges are faded out to prevent black wedges in the printed output when the document image is skewed (column 8, lines 31-36 of Kelly). This would prevent cells positioned at end portions of the document from containing dot information since they are not to be printed.

Lin in view of Hirahara is combinable with Kelly because they are from the same field of endeavor, namely halftone printing and image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to remove dot information from cells positioned at the end portions of the dot pattern tables. The motivation for doing so would have been to fade printing at edges of dot pattern tables and prevent black wedges in the printed output (column 8, lines 34-36 of Kelly). Therefore, it would have been obvious to combine Kelly with Lin in view of Hirahara to obtain the invention as specified in claim 44.

**Regarding claim 45:** The arguments regarding claim 44 are incorporated herein. If the cells in the second direction from among cells positioned at end portions of the dot pattern table do not include dot information, then the gradation value of the dot pattern formed from said cells would inherently be smaller than the gradation value indicated by the dot pattern table where the dot pattern is stored. The dot pattern stored in the dot pattern table is outputted, but the cells in the second direction from among cells positioned at end portions of the dot pattern table are prevented from having dots printed for their respective locations. This lowers the overall number of dots printed for the output dot pattern, resulting in a lower gradation value.

6. Claims 46-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin (US Patent 6,633,412 B1) in view of Hirahara (US Patent 5,099,259) and Parker (US Patent 5,341,228).

**Regarding claim 46:** Lin in view of Hirahara does not disclose expressly that said dot pattern table has a blue noise characteristic.

Parker discloses the use of a blue noise characteristic in gray scale halftoning (column 5, lines 38-45 of Parker).

Lin in view of Hirahara is combinable with Parker because they are from the same field of endeavor, namely halftone image data processing and printing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to apply a blue noise characteristic to the dot pattern tables that are produced for the printing operations. The motivation for doing so would have been that blue noise characteristics reduce undesirable printing effects (column 5, lines 45-53 of

Parker). Therefore, it would have been obvious to combine Parker with Lin in view of Hirahara to obtain the invention as specified in claim 46.

**Further regarding claim 47:** Parker discloses that the blue noise characteristic is a characteristic in which a power spectrum in a low frequency region of an image recorded based on the image data is smaller than a power spectrum of a high frequency region (figure 1; column 6, lines 66-68; and column 9, lines 42-58 of Parker).

7. Claims 78-80, 82 and 84 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin (US Patent 6,633,412 B1) in view of Hirahara (US Patent 5,099,259) and Broddin (US Patent 5,799,137).

**Regarding claims 78 and 84:** Lin discloses an image recording apparatus (figure 11 and column 7, lines 23-27 of Lin) comprising a dot-pattern-generation unit for generating a plurality of different dot patterns associated with gradation value and pixel position (column 6, lines 60-63 of Lin), for each color of the recording materials (column 5, lines 14-22 of Lin); and a selection unit for selecting one dot pattern from said plurality of different dot patterns (column 7, lines 5-10 of Lin), based on gradation-value information of the pixel of the image data and position information of the pixel (column 6, line 64 to column 7, line 5 of Lin).

Lin does not disclose expressly a dot-pattern-table storage unit for storing a dot-pattern table having said plurality of said different dot patterns associated with gradation value and pixel position; and that said selection means selects said one dot pattern from said dot-pattern storage unit, wherein said

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selection is further based on color information, and wherein a size of a dot-pattern table corresponding to at least one specific color from among the dot-pattern tables stored in said dot-pattern-table storage unit for each of the plurality of colors is smaller than sizes of dot-pattern tables corresponding to colors other than the specific color.

Hirahara discloses a dot-pattern-table storage unit (figure 46(3) of Hirahara) for storing a dot-pattern table (figure 44 of Hirahara) having a plurality of different dot patterns (column 15, lines 48-53 of Hirahara).

Lin is analogous art since Lin is from the same field of endeavor as the present application, namely controlling dot patterns based on position and grayscale value in a halftone image data processing system. Lin and Hirahara are combinable because they are from the same field of endeavor, namely controlling dot patterns in a halftone image data processing system. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to store the plurality of patterns taught by Lin in the dot-pattern-table storage unit taught by Hirahara. Thus said selection unit taught by Lin selects said one dot pattern from the dot-pattern storage unit taught by Hirahara, wherein the dot pattern table taught by Hirahara has a plurality of different dot patterns associated with gradation value and pixel position, for each color of the recording materials, as taught by Lin. The motivation for doing so would have been to speed up the data processing by having the dot patterns generated by the system of Lin stored, and thus readily accessible. Therefore, it would have been obvious to combine Hirahara with Lin.



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Lin in view of Hirahara does not disclose expressly that a size of a dot-pattern table corresponding to at least one specific color from among the dot-pattern tables stored in said dot-pattern-table storage unit for each of the plurality of colors is smaller than sizes of dot-pattern tables corresponding to colors other than the specific color.

Broddin discloses using a plurality of colors for the purpose of image reproduction (column 2, lines 31-34 of Broddin). Broddin further teaches that artifacts such as Moiré patterns are reduced for lighter colors, such as yellow (column 9, lines 35-40 and column 8, lines 27-34 of Broddin). For CMYK printing, the effects due to the yellow color component are not considered important.

Lin in view of Hirahara is combinable with Broddin because they are from the same field of endeavor, namely image halftone processing and printing so as to reduce printing artifacts. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the dot pattern table storage unit taught by Hirahara store dot patterns tables relating to each color, and have the selection unit select dot patterns further based on the color information indicated by each pixel of the image data. The motivation for doing so would have been to be able to print in multiple colors (column 2, lines 31-34 of Broddin). Furthermore, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a smaller size for the dot pattern tables of a specific color, such as yellow for CMYK printing, that is lighter than the other colors used in printing. The suggestion for doing so would have been that the lighter colors in printing are less critical in terms of problems relating to

printing artifacts (column 9, lines 35-40 of Broddin). A smaller, and therefore less complex, dot pattern table is needed to reduce the problems that arise from printing artifacts for said lighter colors. Therefore, it would have been obvious to combine Broddin with Lin in view of Hirahara to obtain the invention as specified in claims 78 and 84.

Further regarding claim 84: In order for said output unit (recording unit) of the image recording apparatus to output a dot pattern, it must inherently have a recording step for recording the dot pattern. Otherwise, no dot pattern can be output. The apparatus of claim 78 performs the method of claim 84.

**Regarding claim 79:** Lin in view of Hirahara does not disclose expressly that the specific color, initially disclosed in claim 78, is a color having a relatively high lightness from among the plurality of colors.

Broddin discloses that the specific color is a color that is less dense, and thus inherently having a relatively higher lightness, such as yellow for CMYK printing (column 9, lines 35-40 of Broddin).

Lin in view of Hirahara is combinable with Broddin because they are from the same field of endeavor, namely image halftone processing and printing so as to reduce printing artifacts. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a color having a relatively higher lightness for the specific color. The suggestion for doing so would have been that the lighter colors in printing are less critical in terms of problems relating to printing artifacts (column 9, lines 35-40 of Broddin). Therefore, it would have been obvious to combine Broddin with Lin in

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view of Hirahara to obtain the invention as specified in claim 79.

**Regarding claim 80:** Lin in view of Hirahara does not disclose expressly that the colors of the recording materials are four colors, i.e. cyan, magenta, yellow and black, and wherein the specific color is yellow.

Broddin discloses recording images in four colors, i.e. cyan, magenta, yellow and black (column 8, lines 41-43 of Broddin). The specific color is a color that is less dense, specifically yellow for CMYK printing (column 9, lines 35-40 of Broddin).

Lin in view of Hirahara is combinable with Broddin because they are from the same field of endeavor, namely image halftone processing and printing so as to reduce printing artifacts. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use yellow for the specific color if CMYK printing was being performed. The suggestion for doing so would have been that yellow in CMYK printing is less critical in terms of problems relating to printing artifacts (column 9, lines 35-40 of Broddin). Therefore, it would have been obvious to combine Broddin with Lin in view of Hirahara to obtain the invention as specified in claim 80.

**Regarding claim 82:** Lin discloses that the recording head is an ink jet recording head for performing recording by discharging ink (column 4, lines 58-64 of Lin). Lin teaches the use of a plurality of possible printers (column 4, lines 58-64 of Lin), which would include an ink jet printer.

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8. Claims 81 and 83 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin (US Patent 6,633,412 B1) in view of Hirahara (US Patent 5,099,259), Broddin (US Patent 5,799,137), and Slade (US Patent 5,982,993).

**Regarding claim 81:** Lin in view of Hirahara does not disclose expressly that the colors of the recording materials are six colors, i.e. cyan, light cyan, magenta, light magenta, yellow and black, and wherein the specific colors are light cyan, light magenta, and yellow.

Broddin discloses that the specific color is a color that is less dense, and thus inherently having a relatively higher lightness, such as yellow for CMYK printing (column 9, lines 35-40 of Broddin).

Lin in view of Hirahara is combinable with Broddin because they are from the same field of endeavor, namely image halftone processing and printing so as to reduce printing artifacts. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a color having a relatively higher lightness for the specific color. The suggestion for doing so would have been that the lighter colors in printing are less critical in terms of problems relating to printing artifacts (column 9, lines 35-40 of Broddin). Therefore, it would have been obvious to combine Broddin with Lin in view of Hirahara.

Lin in view of Hirahara and Broddin does not disclose expressly that the colors of the recording materials are six colors, i.e. cyan, light cyan, magenta, light magenta, yellow and black; and that the specific colors are light cyan, light magenta, and yellow.

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Slade discloses printing with six colors, namely cyan, light cyan, magenta, light magenta, yellow and black (column 3, line 66 to column 4, line 3 of Slade).

Lin in view of Hirahara and Broddin is combinable with Slade because they are from the same field of endeavor, namely halftoning and image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to print using cyan, light cyan, magenta, light magenta, yellow and black. The motivation for doing so would have been to create an image that more accurately portrays the original (column 4, lines 3-8 of Slade). Furthermore, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to use light cyan, light magenta and yellow as the specific colors. The motivation for doing so would have been that light cyan, light magenta and yellow are the colors with higher relative lightness (column 3, line 66 to column 4, line 3 of Slade; and column 9, lines 35-40 of Broddin) and would therefore be less critical in terms of problems relating to printing artifacts (column 9, lines 35-40 of Broddin). Therefore, it would have been obvious to combine Slade with Lin in view of Hirahara and Broddin to obtain the invention as specified in claim 81.

**Regarding claim 83:** Lin discloses that the recording head is an ink jet recording head for performing recording by discharging ink (column 4, lines 58-64 of Lin). Lin teaches the use of a plurality of possible printers (column 4, lines 58-64 of Lin), which would include an ink jet printer.

Lin in view of Hirahara and Broddin does not disclose expressly that the ink is discharged by utilizing thermal

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energy, and that a thermal energy generation member generates the thermal energy provided to the ink.

Slade discloses using a thermal ink jet printer (column 3, lines 56-59 of Slade). A thermal ink jet printer inherently has some form of thermal energy generation member that generates the thermal energy that is provided to the ink for the purpose of discharging said ink from the recording heads.

Lin in view of Hirahara and Broddin is combinable with Slade because they are from the same field of endeavor, namely printing and image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a thermal ink jet printer for printing the output image, formed of the output dot patterns. The motivation for doing so would have been that a thermal printer is one of a plurality of useful types of printers for printing color images (column 3, lines 58-62 of Slade). Therefore, it would have been obvious to combine Slade with Lin in view of Hirahara and Broddin to obtain the invention as specified in claim 83.

***Allowable Subject Matter***

9. Claims 48-52, 56, 60, 64 and 68 are allowed.

The following is an examiner's statement of reasons for allowance:

Claim 48 recites a selection means for selecting one dot pattern based on gradation-value information of the pixel of the image data and the position information of the pixel, from a dot-pattern-table storage unit for storing X (N>X) dot patterns for X gradation values, and a dot pattern generation means for generating dot patterns corresponding to (N-X) predetermined

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gradation values. If a dot pattern table corresponding to the gradation value information is stored in a dot pattern table storage unit, the dot pattern selected by the selection means is recorded by the recording head. If a dot pattern table corresponding to the gradation value information is not stored in the dot pattern table storage unit, dot patterns corresponding to the predetermined gradation values generated by said dot pattern generation means are recorded by the recording head. Examiner has been unable to find prior art which teaches all of the above features, thus anticipating claim 48 or rendering claim 48 obvious to one of ordinary skill in the art at the time of the invention. Thus, claim 48 is deemed allowable.

Claims 49-51 are deemed allowable by virtue of their dependence from claim 48.

Claim 60 is a method claim which recites similar limitations as recited in claim 48. Claim 60 is deemed allowable for reasons similar to claim 48.

Claims 52 and 56 recite a dot pattern storage unit for storing  $X$  ( $N > X$ ) dot patterns for  $X$  gradation values, and a dot pattern generation means for generating dot patterns corresponding to  $(N-X)$  predetermined gradation values. A first and second selection means for selecting the dot pattern from the dot pattern table are also recited. If a dot pattern table corresponding to the gradation value information is stored in the dot pattern table storage unit, the dot pattern selected by the second selection means is recorded by the recording head. If a dot pattern table corresponding to the gradation value information is not stored in the dot pattern table storage unit, dot patterns corresponding to the predetermined gradation values generated by said dot pattern generation means are recorded by

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the recording head. Examiner has been unable to find prior art which teaches all of the above features, thus anticipating claim 52 or rendering claim 52 obvious to one of ordinary skill in the art at the time of the invention. Thus, claim 52 is deemed allowable.

Claim 64 is a method claim which recites similar limitations as recited in claim 52. Claim 64 is deemed allowable for reasons similar to claim 52.

Claim 68 is a method claim which recites similar limitations as recited in claim 56. Claim 68 is deemed allowable for reasons similar to claim 56.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A. Thompson whose telephone number is 571-272-7441. The examiner can normally be reached on 8:30AM-5:00PM.

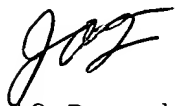
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K. Moore can be reached on 571-272-7437. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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19 December 2005

James A. Thompson  
Examiner  
Art Unit 2624



THOMAS D. [unclear]  
[unclear] EXAMINER